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CHEMICAL ERADICATION OF THE COMMON BARBERRY¹

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DIFFICULTIES OF ERADICATION

The common barberry (*Berberis vulgaris*) is very difficult to kill by digging but is readily killed by certain chemicals. That digging so frequently fails is due to the readiness with which small root fragments left in the ground may sprout and reproduce the bush. Root fragments smaller than a lead pencil have frequently been known to sprout, and even small chips from the crown may do so when conditions are favorable. Sprouts are most likely to appear when the roots or chips are buried only a few inches in moist warm earth. The sprouts will seldom penetrate more than 6 inches of firm soil, although in light, sandy soil or from large roots they may emerge from a greater depth. If bushes are dug in unfavorable situations, as in hard or stony ground or among the roots of large trees or shrubbery, it is almost certain that many root fragments will be left, and as most of the roots grow near the surface, sprouts are likely to come from them. It not infrequently happens that a ring 6 or 8 feet in diameter formed by sprouts growing from the broken ends of lateral roots will appear around the margin of the hole where the old bush was dug. The use of chemicals obviates this difficulty and is strongly recommended wherever valuable plants will not be endangered and where a slight sterilization of the soil for a few years will not be objectionable.

Many chemicals have been tested in the effort to find the best means of killing barberries. Several were found to be very effective, and the use of two of these, common salt and kerosene, is described

¹ The Office of Cereal Investigations of the Bureau of Plant Industry, United States Department of Agriculture, is cooperating with 13 of the North-Central grain-growing States in eradicating the common barberry and certain other closely related species in order to reduce losses due to stem rust of grain. The Japanese barberry, *Berberis thunbergii*, is immune from stem rust and is not being eradicated.

in this circular. In Department Circular 268 sodium-arsenite solution was recommended. While that chemical is very effective, its extremely poisonous nature is objectionable, and it no longer is recommended for general use.

DIRECTIONS FOR THE USE OF SALT AND KEROSENE

SALT

For barberries having a group of shoots about 12 inches in diameter at the base, use 10 pounds of dry salt. For plants about 6 inches in diameter, use 5 pounds. For small plants having only one or two shoots, use 2 pounds. For large clumps estimate the area at the surface of the ground plus a border 6 inches in width and use 2 pounds of salt for each square foot.

Pile the salt in and about the base of the plant in such a manner that it will surround all shoots. Be very careful that no shoots are missed, especially those growing a little way from the main clump. With large clumps be sure that the distribution of the salt is uniform and that no outlying shoots are missed.

The plants may be cut down before treatment or left standing. This treatment is successful at any time of the year when the ground is not frozen. If there is danger of the salt being disturbed by livestock or otherwise, it may be covered by dirt, stones, brush, etc. Do not allow farm animals to have access to the salt unless they previously have been given enough so they are not hungry for it.

KEROSENE

For barberries having a group of shoots about 12 inches in diameter at the base, use 1 gallon of kerosene. For plants 6 inches in diameter, use 2 quarts. For small plants having only one or two shoots, use 1 pint. For large clumps estimate the area at the surface of the ground plus a border 6 inches in width and use 1 quart for each square foot.

Apply the kerosene to the base of the plant in such a manner that it wets the base of every shoot and also the ground for 3 or 4 inches around every shoot. Use care not to miss shoots growing a short distance from the main clump. With large clumps be sure that the distribution of the chemical is uniform and especially that outlying shoots are not missed.

The barberries may be cut before treatment or left standing. This treatment is successful if applied at any time during the growing season, but the action of the kerosene is slow, and immediate results should not be expected. Poultry and livestock may be safely allowed to have free access to treated bushes.

ROOT SYSTEM OF THE COMMON BARBERRY

Numerous bushes that were only partially killed by a salt or kerosene treatment have been found. Many of these failures have been traced to carelessness on the part of the person making the treatment, but they may be due also to a lack of understanding of the barberry. A young barberry develops a single shoot. Other shoots arise from near the base of this one, either below or just above the surface of the ground, and form a compact crown. The older shoots may live 20 years or more, but eventually they die and are replaced by new ones.

The common barberry has two different kinds of roots. The most noticeable ones when the bush is dug are the relatively large lateral or supporting roots, but there is always an abundant development of small fibrous feeding roots. The lateral roots may lie from a few inches to a foot or more below the surface of the ground and may extend 10 or 15 feet from the crown of the bush. It is these roots that make eradication by digging so difficult, as they sprout readily wherever cut. The fibrous feeding roots grow chiefly immediately around the crown of the bush and are seldom found abundantly at a distance. They are the roots that the chemical treatments are intended to reach, and if they are killed the lateral roots, if undisturbed, will not sprout.

Around the central compact group of shoots other shoots may arise at any distance from a few inches to several feet from the parent crown. These may develop from injured lateral roots, but most frequently they come from stolons or stems which grow laterally underground from the parent bush. As soon as these stolons break through the surface of the ground and develop leaves they also develop a mass of fine feeding roots immediately below the point at which they emerge. When such development has occurred cutting the stolon will not injure the sprout, as each sprout essentially is an independent plant. It thus is possible to treat and kill the parent bush with chemicals without injuring these surrounding sprouts. In order to insure their death, they must be treated individually. In most cases where a treatment has failed to kill the entire clump, it is one of these sprouts that has survived, and the survival was due to faulty treatment. It is consequently essential to successful treatment of barberries to apply the chemical so that every shoot shall receive its share.

PRECAUTIONS IN THE USE OF SALT AND KEROSENE

As barberries are readily killed by salt or kerosene, so may other plants be killed. If barberries are treated near valuable shrubs or trees, these shrubs or trees also may be killed. It is impossible to state any definite distance from valuable plantings beyond which it would be safe to use chemicals. In general, however, it may be said that if the roots of valuable plants come within the area to which the chemical actually is applied, the plants may be injured or killed. This may be taken as a safe working rule, but it does not mean that all plants whose roots enter a treated area will be materially injured.

There is nearly as much variation in the underground portions of plants as in the aerial parts, and just as barberries are apparently uninjured by salt or kerosene applied in large quantities among their lateral supporting roots and are only killed where the treatment reaches the small feeding roots immediately around the base of the stems, so other kinds of plants may be uninjured by treatments made within their root areas. In practice it has been found that escaped barberries growing in woodlands in the north-central part of the United States may be treated with little danger to any of the trees. However, the chemical treatment of barberries growing near valuable planted shrubbery or trees is not recommended.

Either salt or kerosene applied to soil in quantities as large as are recommended in this circular will kill all surface vegetation in

the area to which the chemical actually is applied. On fairly level land the sterile area will not ordinarily be larger than the area treated; that is, the sterile area resulting from the treatment will not be more than was previously occupied by the barberry clump. When salt is applied to barberries in the north-central part of the United States, where the annual rainfall is 30 inches or more, the ground will be more or less covered by vegetation during the second summer after treatment, and by the third year little difference between treated and untreated ground can be noticed. As a result of irrigation or cultivation, the time during which the ground remains sterile is lessened. In the more arid parts of the country sterility lasts longer. The soil will not remain sterile quite as long after a kerosene treatment as after salt.

Kerosene in small quantities is not harmful to farm animals, and they may be safely allowed free access to barberries thus treated. Salt, on the other hand, while a necessary part of the diet of all animals, is harmful if a large quantity is eaten at one time. While young poultry are especially liable to injury, even cattle may eat too much if they are salt hungry. It is generally agreed that farm animals should have free access to salt at all times, and where they do there can be no danger in allowing them access to barberries treated with salt. However, cattle are likely to scatter the salt applied to barberry bushes to such an extent that the treatment may be unsuccessful, and it is always a good plan to cover the salt with stones, sod, brush, etc., so that it will not be disturbed.

SALT COMPARED WITH KEROSENE

Whether salt or kerosene should be selected for treating barberries will depend on the circumstances of the particular case under consideration. From the standpoint of safety, for use in barnyards or in small pastures where there are salt-hungry livestock, kerosene is preferable. The oil companies usually will deliver kerosene to any point desired at a cost about equal to that of salt. Where it must be carried by hand over rough ground or up steep hills the labor involved is greater than with salt. The action of kerosene on the bushes, moreover, is very slow, and bushes treated in the spring may still be able to spread rust that year. It is also rather difficult to keep track of barberry bushes treated with kerosene when a large number are growing in one area. For this reason some are likely to be missed and these can not be located until several months after the treatment, when the treated ones will be dying or dead.

Salt, on the other hand, involves a slight risk when used around a barnyard. While the risk may be obviated by covering the chemical, this increases the cost of the application. The cost of transportation of the two chemicals on level ground is about the same, but on rough ground salt is preferable. Any type of salt is satisfactory, from coarse crushed rock salt or ice-cream salt to the more finely ground salts used for curing hides or salting cattle. Crushed rock salt in bulk is cheapest and is easily handled when put in sacks holding 100 pounds or less. The action of salt is rapid, and the barberries usually are dead in a week or two after treatment. There also is much less danger of missing bushes where large numbers are treated in one area, and a check up of such areas may be made at any time after the treatment.

